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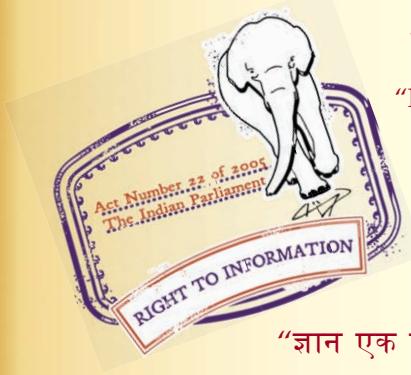
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IS 7778-10 (2003): Small Tools Sampling Inspection  
Procedures, Part 10: Carbide Tips and Indexable Inserts  
[PGD 32: Cutting tools]

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Bhartṛhari—Nītiśatakam

“Knowledge is such a treasure which cannot be stolen”





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भाग 10 कार्बाईड टिप्स और इन्डेक्सबल इंसर्ट्स  
( पहला पुनरीक्षण )

*Indian Standard*

SMALL TOOLS SAMPLING INSPECTION  
PROCEDURES

**PART 10 CARBIDE TIPS AND INDEXABLE INSERTS**

*( First Revision )*

ICS 25.100.01

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**BUREAU OF INDIAN STANDARDS**  
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## FOREWORD

This Indian Standard (Part 10) (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Drills, Reamers and Threading Tools Sectional Committee had been approved by the Basic and Production Engineering Division Council.

This standard was first published in 1975. In the light of experience gained over the years, in this revision following changes have been incorporated:

- a) Definition of various terminologies used in the standard have been aligned with the practice followed at ISO level,
- b) Scale of sampling and criteria of conformity have been modified,
- c) Classification of non-conformities for various type of cutting tools have been updated, and
- d) To cater the specific need of the different industries and to make this standard user friendly, this standard has been splitted in 11 Parts for easy adoption/acceptance and guide updation.

This standard has been prepared based on prevalent practice and experience available in the Indian Industries. While formulating this standard considerable assistance has been derived from IS 2500 (Part 1) : 2000 'Sampling inspection procedures: Part 1 Attribute sampling plans indexed by acceptable quality level (AQL) for lot-by-lot inspection (*third revision*)'. IS 7778 'Small tools sampling inspection procedures' is now being published in 11 Parts. Other parts of the standard are give below:

- Part 1 Twist drills, countersinks and counterbores
- Part 2 Reamers
- Part 3 Sleeves, sockets and adaptors
- Part 4 Screwing taps, dies and knurling tools
- Part 5 Milling cutters
- Part 6 Milling arbors and accessories
- Part 7 Gear cutting tools and broaches
- Part 8 Saws
- Part 9 Single point (HSS and carbide tipped) tools
- Part 11 Hard metal burrs

# Indian Standard

## SMALL TOOLS SAMPLING INSPECTION PROCEDURES

### PART 10 CARBIDE TIPS AND INDEXABLE INSERTS

*(First Revision)*

#### 1 SCOPE

This standard (Part 10) specifies sampling plans and procedures for carbide tips and indexable inserts submitted for inspection in lots.

#### 2 REFERENCES

The following standards contain provisions which through reference in this text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	Title
2500 (Part 1) : 2000	Sampling inspection procedures: Part 1 Attribute sampling plans indexed by acceptable quality level (AQL) for lot-by-lot inspection ( <i>third revision</i> )
4905 : 1968	Methods for random sampling

#### 3 TERMINOLOGY AND DEFINITIONS

**3.0** For the purpose of this standard the following definitions shall apply. For terms not defined below and for other clarifications, reference may be made to IS 2500 (Part 1).

**3.1 Defect** — A departure of a quality characteristic that results in a product, process or service not satisfying its intended normal usage requirements.

**3.2 Non-Conformity** — A departure of a quality characteristic that results in a product, process or service not meeting a specified requirement. Non-conformities will generally be established by their degree of seriousness, such as:

Class A	— Those non-conformities of a type considered to be of the highest concern for the product or service. In acceptance sampling, such types of non-conformity will be assigned very small AQL values.
Class B	— Those non-conformities of a type considered to have the next lower

degree of concern. Therefore these can be assigned a larger AQL value than those in Class A and smaller than in Class C, if a third class exists.

**3.3 Non-Conforming Unit** — A unit of product or service containing at least one non-conformity. Non-conforming units will generally be classified by their degree of seriousness such as:

Class A	— A unit which contains one or more non-conformities of Class A and may also contain non-conformities of Class B and/or Class C.
Class B	— A unit which contains one or more non-conformities of Class B and may also contain non-conformities of Class C, but contains no non-conformity of Class A.

**3.4 Percent Non-Conforming** — The percent non-conforming of any given quantity of units of products is 100 times the number of non-conforming units divided by the total number of units of products, that is:

Percent non-conforming

$$= \frac{\text{Number of non-conforming units}}{\text{Total number of units}} \times 100$$

**3.5 Acceptable Quality Level (AQL)** — When a continuous series of lots is considered, the quality level which for the purpose of sampling inspection is a limit of a satisfactory process average.

**3.6 Sampling Plan** — A specific plan which indicates the number of units of products from each lot which are to be inspected (sample size or series of sample sizes) and the associated criteria for determining the acceptability of the lot (acceptance and rejection numbers).

**3.7 Lot** — A collection of units of product from which a sample shall be drawn and inspected to determine conformance with the acceptability criteria, and which may differ from a collection of units designated as a lot for other purposes (for example, production, shipment, etc).

**3.8 Sample** — A sample consists of one or more units of product drawn from a lot, the units of the sample being selected at random without regard to their quality. The number of units of product in the sample is the sample size.

## 4 SCALE OF SAMPLING

**4.1** All small tools shall be selected at random from a lot as per IS 4905 to ensure randomness of selection.

**4.2** Small tools shall be selected and examined for each lot separately for ascertaining its conformity to the requirements of the relevant specification.

The number of small tools to be selected from a lot shall depend on the sizes of the lot and type of sampling plans and shall be in accordance with Tables 1, 2 and 3.

## 5 DETERMINATION OF ACCEPTABILITY

**5.1** To determine acceptability of a lot under percent non-conforming inspection, the single sampling plan shall be used in accordance with **5.1.1** for hardness test and performance test and the double sampling plan shall be used in accordance with **5.1.2** for dimensional and visual characteristics.

### 5.1.1 Single Sampling Plan

The number of sample units inspected shall be equal to the sample size given by the plan. If the number of non-conforming units found in the sample is equal to or less than the acceptance number, the lots shall be

considered acceptable. If the number of non-conforming units is equal to or greater than the rejection number, the lot shall be considered not acceptable.

### 5.1.2 Double Sampling Plan

The number of sample units first inspected shall be equal to the first sample size given by the plan. If the number of non-conforming units found in the first sample is equal to or less than the first acceptance number, the lot shall be considered acceptable. If the number of non-conforming units found in the first sample is equal to or greater than the first rejection number, the lot shall be considered not acceptable.

If the number of non-conforming units found in the first sample is between the first acceptance and rejection numbers, a second sample of the size given by the plan shall be inspected. The number of non-conforming units found in the first and second samples shall be accumulated. If the cumulative number of non-conforming units is equal to or less than the second acceptance number, the lot shall be considered acceptable. If the cumulative number of non-conforming units is equal to or greater than the second rejection number the lot shall be considered not acceptable.

## 6 CLASSIFICATION OF NON-CONFORMITY

Non-conformities of various inspection parameters for carbide tips and indexable inserts covered under various Indian Standards have been classified as Class A and Class B and are tabulated in Tables 4 and 5.

**Table 1 Scale of Sampling and Criteria for Conformity for Lot Quality for Visual and Dimensional Characteristics (Double Sampling Plan for Normal Inspection — Inspection Level III)**  
(Clause 4.2)

Sl No.	Lot Size	Sample	Sample Size	Cumulative Sample Size	Non-Conformity			
					Class A AQL 1.5		Class B AQL 4.0	
					Ac	Re	Ac	Re
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
i)	Up to 150	First Second	20 20	20 40	0 1	2 2	1 4	4 5
ii)	151 to 280	First Second	32 32	32 64	0 3	3 4	2 6	5 7
iii)	281 to 500	First Second	50 50	50 100	1 4	4 5	3 8	7 9
iv)	501 to 1 200	First Second	80 80	80 160	2 6	5 7	5 12	9 13
v)	1 201 to 3 200	First Second	125 125	125 250	3 8	7 9	7 18	11 19

**Table 2 Scale of Sampling and Criteria for Conformity for Lot Quality for Hardness Test (Single Sampling Plan for Normal Inspections — Inspection Level I)**  
(Clause 4.2)

SI No.	Lot Size	Sample Size	AQL 1.5	
			Ac	Re
(1)	(2)	(3)	(4)	(5)
i)	Up to 280	8	0	1
ii)	281 to 1 200	32	1	2
iii)	1 201 to 3 200	50	2	3

**Table 3 Scale of Sampling and Criteria for Conformity for Lot Quality for Performance Test (Single Sampling Plan for Reduced Inspections — Inspection Level S-3)**  
(Clause 4.2)

SI No.	Lot Size	Sample Size	AQL 4.0	
			Ac	Re
(1)	(2)	(3)	(4)	(5)
i)	Up to 150	2	0	1
ii)	151 to 3 200	5	0	2

**Table 4 Classification of Non-Conformity in Carbide Tips**  
(Clause 6)

SI No.	IS No.	Type of Tool	Class A Non-Conformity	Class B Non-Conformity
(1)	(2)	(3)	(4)	(5)
i)	9775	Carbide flats, square and rounds — for flats and square — for rounds	Thickness $a$ Width $t$ Diameter $d$	Length $l$
ii)	11441	Ground carbide round	Diameter	Length
iii)	12728	Carbide tips for dead centres	Diameter $d$	Dimensions $l$ and $d_1$
iv)	13741 (Part 1)	Carbide tips for single point tool Type A and Type B	Thickness $s$ Length $l$	Height $t$ Radius $r$
		Type C	Thickness $s$ Length $l$	Height $t$
		Type D	Thickness $s$ Length $l$	Height $t$
		Type E	Thickness $s$ Length $l$	Height $t$ 80° angle
v)	13741 (Part 2)	Carbide tips for light cutting operation Type G, H, J	Thickness $s$ Length $l$	Width $t$ Radius $r$
vi)	13741 (Part 3)	Carbide tips for single point tools blanks (IND 5 and IND 6) for sliding head automats	Thickness $s$ Width $t$	Length $l$ Radius $r$
vii)	13741 (Part 4)	Carbide tips for multipoint tools	Thickness $s$ Width $t$	Length $l$
viii)	13741 (Part 5)	Carbide tips for twist drills with point angle 115° Type AB	Thickness $s$ Length $l$	Width $t$ 115° point angle

**Table 5 Classification of Non-Conformity in Indexable Carbide Inserts**  
(Clause 6)

Sl No.	IS No.	Type of Tool	Class A Non-Conformity	Class B Non-Conformity
i)	4022	Indexable (throw away) carbide inserts without fixation hole Type 'TN' triangular inserts with 0° normal clearance Type 'TP' triangular inserts with 11° normal clearance Type 'SN' square inserts with 0° normal clearance Type 'SP' square inserts with 11° normal clearance	Dimension $m$ and 60° angle Dimension $m$ and 60° and 11° angle Dimensions $l$ $m$ and 90° angle Dimensions $l$ , $m$ and 90° and 11° angles	Dimensions $s$ and $r$ Dimensions $s$ and $r$ Dimensions $s$ and $r$ Dimensions $s$ and $r$
ii)	11523	Indexable hard metal (carbide) inserts with wiper edges without fixing hole — Square inserts — Triangular inserts	Dimensions $l$ , and $m$ , and 45°, 75°, 90° and 11° angles Dimension $m$ , and 60°, 90°, 11°, 15° and 20° angles	Dimension $s$
iii)	11677	Indexable (throw away) carbide inserts with cylindrical fixation hole Triangular inserts Square inserts Rhombic inserts with 80° included angle Rhombic inserts with 55° included angle	Dimension $m$ and 60° angle Dimensions $m$ , $l$ and 90° angle Dimensions $m_1$ and $m_2$ and 80° and 100° angles Dimension $m$ and 55° angle	Dimension $s$ , radius and hole diameter Dimension $s$ , radius and hole diameter Dimension $s$ , radius and hole diameter Dimension $s$ , radius and hole diameter
iv)	12354	Indexable carbide inserts with partly cylindrical fixation hole Triangular inserts with 7° normal clearance Square inserts with 7° normal clearance Rhombic inserts with 7° normal clearance and 80° included angle Rhombic inserts with 7° normal clearance and 55° included angle Rhombic inserts with 5° normal clearance and 35° included angle Rhombic inserts with 7° normal clearance and 35° included angle Round inserts with 7° normal clearance	Dimension $m$ and 60° and 7° angles Dimensions $m$ , $l$ , and 90° and 7° angles Dimensions $m_1$ , $m_2$ and 80°, 100° and 7° angles Dimension $m$ and 55° and 7° angles Dimension $m$ and 35° and 5° angles Dimension $m$ and 35° and 7° angles Dimension $d$ and 7° angle	Dimension $s$ , radius and hole diameter Dimension $s$ , radius and hole diameter

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